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(54) **MILLIMETER WAVE ANTENNAS HAVING CONTINUOUSLY STACKED RADIATING ELEMENTS**

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(57) **ABSTRACT**

An electronic device may be provided with a phased antenna array. The array may convey signals greater than 10 GHz and may be formed on a substrate having transmission line layers and antenna layers. An antenna in the array may have a radiating element that includes first, second, and third overlapping patch elements on the antenna layers. The antenna may be fed using a differential transmission line coupled to a differential feed on the first patch element. The differential transmission line may include first and second signal traces. A first via may couple the first signal trace to the first, second, and third patch elements. A second via may couple the second signal trace to the first, second, and third patch elements. The patch elements may introduce capacitances to the radiating element that help to compensate for inductances associated with the distance between the radiating element and the signal traces.